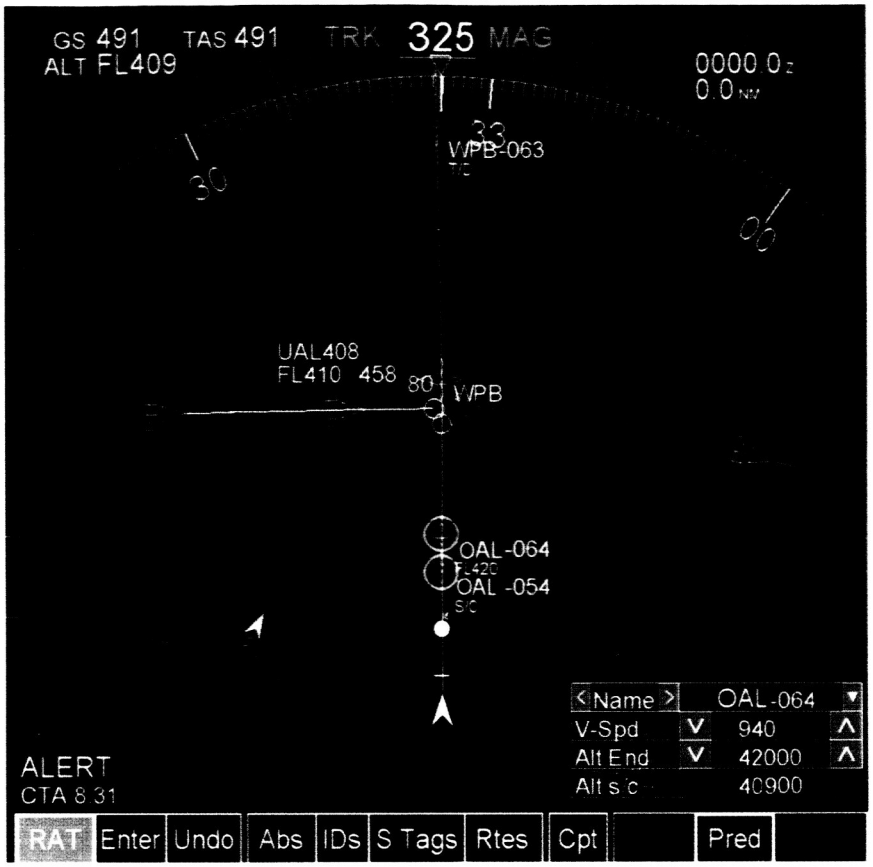

Fig. 2. Using the route assessment tool to modify a flight plan (inserting a climb) to avoid the conflict.

Aviation Performance Measuring System

Thomas R. Chidester

The Aviation Performance Measurement System (APMS) implemented several key tools for interpreting and analyzing aircraft performance data in cooperation with an airline partner; two of the tools were commercialized. The APMS Program is developing the next generation of tools for analyzing and interpreting flight data. Airlines, military units, corporate operators, and others have begun the process of analyzing aircraft flight data to identify contributing factors and to develop corrective actions for situations in which aircraft performance parameters exceed normal limits for a given phase of flight. These current programs are referred to as Flight Operational Quality Assurance (FOQA, or MOQA in the military).

But this process uses only a portion of the data. It scans large quantities of data to extract and make understandable a small number of predefined events. As a result, there is far more potential information in these data sets, information that could help operators understand and enhance the safety, reliability, and economics of their flight operations. The challenge is to find and cull out—from the mass of data

generated by aircraft systems and collected by data recorders—the key information that can be used for these other purposes. Scanning, analyzing, and reporting must be automated to produce meaningful information for the human analyst to act upon.

APMS implemented several key tools for this process in FY00, and FOQA vendors commercialized two of them. With its first airline partner, Alaska Airlines, APMS implemented five new analysis tools:

1. *Special Event Processing System* assists the FOQA analyst in analyzing, decision-making, decision-tracking, reporting, communicating, and recording for future reference information related to flight exceedances.

2. *Report Generator* assists FOQA managers in charting counts and rates of exceedances or special events through automated generation of uniform, high-quality, graphical reports of flight data trends.

3. *Graphics Viewer* assists the FOQA analyst in interpreting and verifying exceedances or special events by displaying the data traces of a specific flight in great detail for a period of minutes surrounding the event as depicted (fig. 1).

4. *Routine-Events* presents the distribution of flight parameters around "check points" that occur within each flight and are tied to standard operating procedures. This allows the FOQA analyst to make an immediate and obvious comparison of actual line-operation performance and operator-specified standard procedures.

5. *Pattern Search* enables the FOQA analyst to search any portion of the database for any specified pattern of flight parameters. This allows exploratory analysis of flight parameters that may be associated with precursors of exceedances or special events.

FOQA vendors implemented two of these tools in their commercially available software

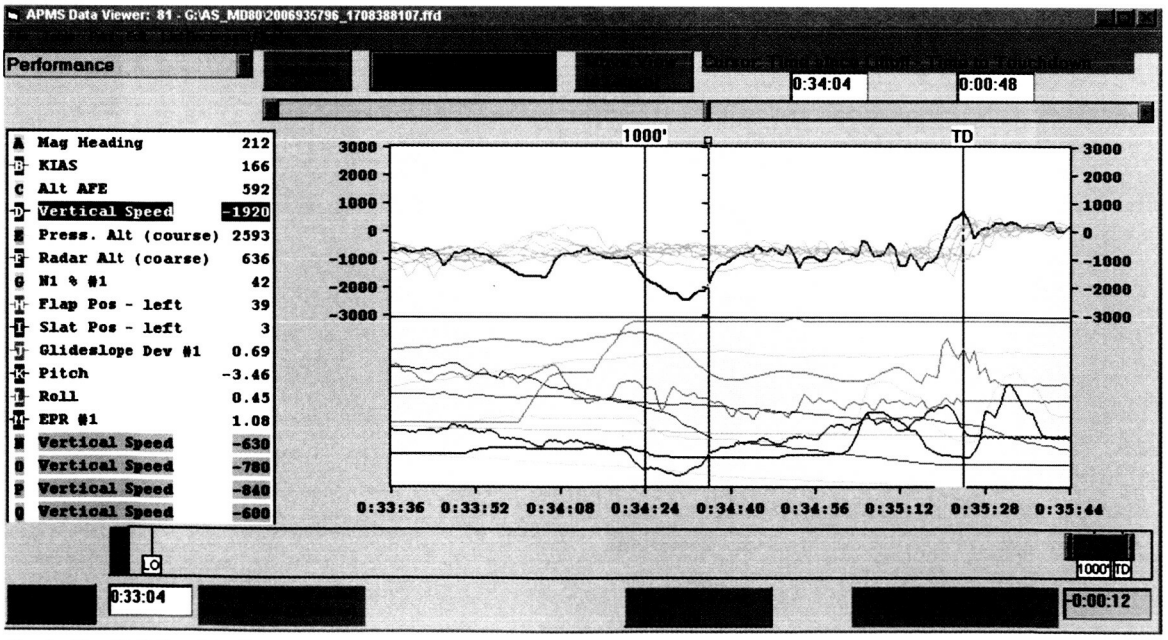

Fig. 1. The APMS Graphics Viewer.

packages in accordance with the terms of Space Act Agreements with their organizations. The Flight Data Company Ltd. (now Spirent-Heathrow) implemented the Report Generator in its Ground Replay and Analysis Facility. Teledyne Controls implemented Routine Events in its Flight Data Replay and Analysis System (FLDRAS).

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Performance Data Analysis and Reporting System

Irving C. Statler

The Performance Data Analysis and Reporting System (PDARS) provides decision makers with a comprehensive, accurate, and insightful method for routinely monitoring the operational health, performance, and safety of the National Airspace System (NAS). The purpose of PDARS is to provide the technological developments that will enable a cultural change from the current reactive approach, of identifying and alleviating life-threatening aviation conditions and events, to a more proactive approach, while still meeting the projected requirements of increasing air traffic. PDARS pursues this objective by establishing a capability for facility-level managers to monitor air traffic control performance in the NAS, identifying and analyzing operational performance problems, and designing and evaluating improvements. PDARS incorporates innovative technology for the real-time collection and rapid processing of large volumes of complex data, and state-of-the-art tools for extracting, presenting and visualizing information such as radar flight tracks.

Six FAA facilities representing a microcosm of the NAS—Southern California and San Francisco Bay TRACONs (Terminal Radar Approach Controls), Los Angeles and Oakland Centers, the Western-Pacific Region, and the System Command Center were selected to participate in an operational evaluation of the concept and tools. An initial PDARS prototype was implemented and fielded at the six sites. Data were accessed daily from all sites, processed overnight, and reports delivered routinely to all six facilities each morning. Examples of the displays and reports appear in figures 1 and 2, respectively. FAA personnel have been trained on PDARS, and both the system and its reports are being used on a day-to-day basis.

PDARS accomplished several key milestones in this process in FY00, including the completion, evaluation, and demonstration of a prototype network, generation of daily reports, and the design review and delivery of the first upgrades to the capabilities of the prototype network. Both informal feedback and a formal design review yielded positive comments on the prototype, guidance for where to pursue upgrades, and a drive to expand the capability to other facilities.

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